इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 13440 (1992): Code of safety for methyl chloride [CHD 8: Occupational Safety, Health and Chemical Hazards]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS 13440 : 1992

(Reaffirmed 2002)

Indian Standard

METHYL CHLORIDE — CODE OF SAFETY

UDC 547·222·1 : 614·8

© BIS 1992

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

***June* 1992** **Price Group 3**

Chemical Hazards Sectional Committee CHD 007

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Hazards Sectional Committee had been approved by the Chemical Division Council.

Methyl chloride is used as a methylating and chlorinating agent in synthesis of organic chemicals. In petroleum refineries, it is used as an extractant for greases, oils and resins. Methyl chloride is also used as a solvent in the synthetic rubber industry, as a refrigerant and as a propellant in polystyrene foam production. It is an intermediate in drug manufacture. It has a toxic effect on human health — particularly, the nervous system, liver, kidney and blood forming tissues. In the preparation of this code considerable assistance has been derived from the following publications.

a) Irving Sax : Dangerous properties of industrial materials. Reinhold Publishing Corporation, New York, USA.

b) Toxic and Hazardous Industrial Chemicals Safety Manual — Japan 1984.

c) Chemical Safety Data Sheet No. SD 40 by Manufacturing Chemists Association, USA, Edition 1970.

Indian Standard

METHYL CHLORIDE — CODE OF SAFETY

1 SCOPE

1.1 This standard covers properties of methyl chloride, the nature of hazards associated with it and essential information on personal protective equipment, storage, handling, labelling, transport, spillage/leakage and waste disposal, fire prevention and fire fighting, training and health monitoring and first aid.

This code does not, however, deal with specifications for design of buildings, chemical engineering plants, storage vessels, equipment for waste disposal and operations control.

2 REFERENCE

IS 4155 : 1966 'Glossary of terms relating to chemical and radiation hazards and hazardous chemicals' is necessary adjunct to this standard.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 4155 : 1966 shall apply.

4 GENERAL PROPERTIES

4.1 General Information

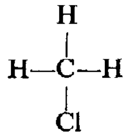
Methyl chloride is a colourless, transparent low boiling liquid with faintly sweet ether like odour. At room temperature, it is in gaseous state. The gas is heavier than air.

4.1.1 *Common Name* — Methyl chloride.

4.1.2 *Chemical Name* — Chloromethane, Methyl Chloride, Monochloromethane.

4.1.3 *Empirical Formula* — CH_3Cl.

4.1.4 *Molecular Formula* —



$$\begin{array}{c} H \\ | \\ H-C-H \\ | \\ Cl \end{array}$$

4.1.5 *Molecular Mass* — 50·5.

4.2 Physical Properties

4.2.1 It is a colourless gas at room temperature with a faintly sweet ether like odour. The technical grade may have a slightly yellow tinge. It is both flammble and explosive and is stored as a liquid under pressure.

4.2.2 *Melting Point/Freezing Point* — minus 97·7 °C.

4.2.3 *Boiling Point* (*at* 760 mm) — minus 23·8°C.

4.2.4 *Specific Gravity* — 0·921 at 20°C/4°C.

4.2.5 *Vapour Pressure* — 489·3 kPa at 20°C,
1 092 kPa at 50°C, and
1 395 kPa at 60°C.

4.2.6 *Solubility* — It is readily soluble in alcohol, chloroform, mineral oils and several other organic liquids.

Volume of methyl chloride gas per volume of water at 760 mm.

Temperature	*Volume*
0°C	7·1
20°C	3·05
40°C	1·7

4.3 Chemical Properties

4.3.1 *Reactivity* — Like other chlorinated hydrocarbon, methyl chloride is generally stable when dry. In the presence of moisture, methyl chloride hydrolysis, with formation of corrosive hydrochloric acid. (Hydrochloric acid attacks most metals with evaluation of H^- which may form an explosive mixture with air). Though at room temperature it is stable, at temperature about 371°C it decomposes on contact with flame or a very hot surface generating toxic fume. It is important to avoid the use of aluminium, zinc, magnesium and other light metals and their alloys in handling methyl chloride.

4.3.2 *Stability at High Temperature* — Auto-ignition at 620°C.

4.3.3 *Light Sensitivity* — No.

4.3.4 *Flammability* — Moderate, classified as "Flammable Gas".

4.4 Fire and Explosion Hazards

4.4.1 *Flash Point* (*Close Cup*) — minus 45°C.

4.4.2 *Ignition Temperature* — Auto-ignition at 620°C.

4.4.3 *Explosive Limits* — (in air at 25°C)
LEL — 8 percent by volume
UEL — 19 percent by volume

4.5 Corrosion

4.5.1 When dry it is inert toward most metals except zinc, aluminium, magnesium and alloys thereof with which it may react explosively when comes in contact with them.

5 TOXICITY AND HEALTH EFFECT

5.1 PEL — 50 ppm (105 mg/m^3).
STEL — 100 ppm (for five minutes every three hours) (215 mg/m^3).
IDLH — 10 000 ppm.
LD$_{50}$ — 2·4 percent by volume for half to one hour (human beings) or 1 800 mg/kg for mice.

5.2 Route of Entry — Inhalation.

5.3 Health Effect

Methyl chloride on inhalation causes the following symptoms:

Central nervous system	— Headache, vertigo (dizziness)
Eyes	— Visual disturbances, dimness of sight, conjunctivitis.
Skin	— Contact with the liquefied gas may cause frost bite or muscular pain.
Systemic	— Causes anemia, cyanosis, weakness and fever. Also results into lack of appetite, nausea and vomiting, abdominal pain, diarrhea and jaundice.

5.3.1 It is absorbed quickly but eliminated slowly. Therefore, repeated exposures are dangerous. After severe exposure, some harmful effects on the nervous system may continue for months or even years. Severe exposure may also affect the liver, kidneys and blood forming tissues. There may be difficulty in urination for one or two days.

5.3.2 It is recommended that peak exposures do not exceed 300 ppm for five minutes every three hours, provided other exposures do not exceed 200 ppm.

6 PERSONAL PROTECTIVE EQUIPMENT

6.1 Suggested Respiratory Protective Devices

Gas mask with organic vapour canister	— where concentration is less than 2 percent (*m*/*v*) and when sufficient air is available.
Self-contained breathing apparatus or air-line respirator	— where concentration is more than 2 percent (*m*/*v*).

6.2 Other Safety Wear

Helmet	— Plastic hard hat
Handgloves/Apron	— PVC, Neoprene
Safety goggles	— Toughened glass
Face shield	— Full cover of transparent plastic
Shoes	— Leather with a PVC sole

All contaminated clothing should be removed immediately and the body thoroughly washed. All the washed clothing should be dried and aired before reuse.

7 STORAGE, HANDLING, LABELLING AND TRANSPORT

7.1 Storage

Storage under a roof is preferable in all seasons. Cylinders should be protected against excessive rise in temperature. Store full and empty cylinders separately. The cylinders containing oxygen should not be mixed with these cylinders.

7.1.1 *Ventilation in Storage Areas*

Good natural ventilation may be adequate, but as methyl chloride vapour is about 1·8 times heavier than air, it has a tendency to settle down. Adequate ventilation will therefore require a mechanical exhaust system, with the air intake at the lowest possible level.

7.1.2 To prevent hazardous accumulation of vapour from the exhaust system, the discharge should be sufficient diluted with air.

7.1.3 *Electrical Fittings in Storage Areas*

Storage tanks should be adequately earthed for lightning protection. All electrical installations should be of flame proof design.

7.2 Handling

7.2.1 Methyl chloride is stored in cylinders of mild steel. While handling these, following precautions should be taken:

a) The cylinders should not be overfilled;
b) The cylinders should be handled carefully, they should not be dropped;
c) The area should be adequately ventilated and protected from fire;
d) Before opening the cylinders they should be earthed to discharge any accumulated static change; and
e) While handling cylinders, use necessary personal protective equipment.

7.3 Labelling

Use of hazard warning symbol/lable in plant area (where storage and handling is done) is strongly recommended.

Information on Lables:

a) Name of material;
b) Danger — vapours hazardous/toxic — avoid breething — flammable;
c) Adequate ventilation;
d) Keep away from heat, open flame;
e) Precaution while handling containers;
f) Valve caps to be replaced;
g) Never drop containers;
h) Never store containers in wet condition;
j) Protect the container from sun; and
k) First aid — If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. In case of difficulty, administer oxygen, call a physician.

7.4 Transport

7.4.1 *Methods of Transport*

Each cylinder and tank must have:

a) an identifying lable or stencil;
b) a lable 'Flammable Compressed Gas';
c) a placard 'Dangerous'; and
d) colour code — Green body, red stripes on sides.

7.4.2 All the persons concerned with transportation of methyl chloride cylinders should be fully informed of dangers associated and precautionary measures to be adopted.

7.4.3 Cylinders should be securely clamped during transport to prevent shifting. Valve protection cap must always be fixed.

7.4.4 Cylinders should be prevented from being dropped. A crane should be used with a safe cradle or a platform should be provided for unloading.

7.4.5 Cylinders should not be used as rollers, supports or for any purpose, other than to carry methyl chloride. While discharging cylinders, connecting lines to equipment should be strong enough to withstand the maximum operating pressure and be provided with liquid/solid traps and/or efficient check valves to prevent suck-back of material into the connecting lines, and the cylinder.

7.4.6 Cylinder valves should be opened slowly. If valve is difficult to open apply force gently but never use a hammer.

7.5 The storage, transportation and handling of methyl chloride in cylinders should conform to the Gas Cylinder Rules, 1981 and its storage, transportation and handling in vessels should conform to the Static and Mobile Pressure Vessels (Un fired) [SMPV (U) Rules, 1981 administered by the Chief Controller of Explosives.

8 SPILLAGE/LEAKAGE AND WASTE DISPOSAL

8.1 Spillage/Leakage

If spills and leaks occur, all sources of ignition must be removed from the area as soon as possible. Only persons provided with adequate personal protective equipment should remain in the area.

8.1.1 Spills, unless very large, usually evaporate rather rapidly and do little damage, but ample ventilation should be provided to prevent the formation of toxic and explosive mixtures. Spills should be cleaned up immediately by absorbing with vermiculite and burning. Cleaning equipment contaminated with or containing spilled methyl chloride should be removed outside and thoroughly dried before reuse.

NOTE — Vermiculites are a group of low grade micas which expand and exfoliate on heating to light water absorbent material. It is used in potting soil.

8.1.2 When servicing or installation, work on equipment using methyl chloride is such that the vapours may escape, ample ventilation should be provided by natural or artificial means as necessary. All sources of ignition must be kept away from the equipment.

8.1.3 The testing of methyl chloride equipment for leaks by the use of an open flame is prohibited.

8.1.4 If container leakage cannot be stopped, the methyl chloride should be transferred to another suitable container. Ample ventilation must be provided to remove escaping vapours. All sources of ignition must be kept away from the area.

8.1.5 In the event of a leak in a tank car which cannot be readily repaired by simple adjustment or tightening of the fittings, the supplier should be telephoned or wired immediately for instructions. The area around the car should be evacuated and only properly protected personnel should be allowed to enter it.

8.1.6 Clothing wet with methyl chloride should be removed immediately and the body washed thoroughly to remove any material which may have penetrated to the skin. The liquid may cause a frost-bite. The clothing should not be used again until thoroughly dry, aired and free of the odour of methyl chloride.

8.2 Waste Disposal

8.2.1 All relevant regulations of local and state authorities for prevention and control of population should be observed.

8.2.2 Water contaminated with methyl chloride may be made safe for disposal by collection in a safe location and treated to meet the desired specifications. Aeration can remove methyl chloride from the effluent.

8.2.3 Burning of methyl chloride produces hydrogen chloride gas. If methyl chloride is incinerated, then the resulting hydrychloric acid gas should be scrubbed by a dilute alkali in a gas scrubber.

9 FIRE PREVENTION AND FIRE FIGHTING

9.1 All electrical installations in a plant area should be flame proof.

9.1.1 Open flames, local hot spots, friction and static electricity must be avoided when working with this material. Smoking should be strictly prohibited in the area.

9.1.2 Where there is a possibility of methyl chloride air mixture in pipelines, flues, tanks, or other containers coming within flammable range, approved and tested, methods and equipment, for preventing flash backs — such as flame arrestors should be provided.

9.1.3 The transfer system should be grounded to reduce the static electricity hazard.

9.2 Fire Fighting

9.2.1 The best method of extinguishing such fires is by stopping the flow of gas.

9.2.2 Carbon dioxide or dry chemical powder may be used to extinguish the flame. Alternatively, where circumstances warrant, the flame may be allowed to continue burning, while the surrounding area and objects should be cooled with a spray of water, to prevent spreading of fire.

9.2.3 After extinguishing the fire, if the flow of gas continues, care should be taken to avoid accumulation of explosive gas in any confined pocket.

10 TRAINING AND HEALTH MONITORING

10.1 Training

10.1.1 *Preplacement Training in Regular Emergency Safety Procedures*

Instructions shall be given for handling emergency situations. These include:

a) Detailed procedure for tackling foreseeable abnormalities;

b) Aide-memoire of key points, backed by general training which while provide guidance for the corrective action in emergency — or potential emergency situations which have not been dealt with as specific cases; and

c) Modifications — As training should be given from the operating angle, all drawings should be kept up-to-date, to include any modifications to plant or procedure.

10.1.2 *Refresher Training*

This should be given, particularly when modifications to the plant have taken place, to ensure that all are aware of their own and other people's responsibilities and of the actions to be taken in both normal and emergency situations.

10.2 Health Monitoring

10.2.1 *Pre-employment Medical Examination*

This is required for employees who would be exposed to methyl chloride. Individuals having following conditions, should not be exposed to methyl chloride:

a) Anemia;

b) Disease of the central nervous system;
c) Alcoholism; and
d) Diseases of kidney or liver.

The workers shall undergo medical examination at least once a year.

10.2.2 The records of examination should be maintained regularly. A specific treatment given for any deficiency should also be recorded.

11 FIRST AID

11.1 Most important is quick removal from exposure.

11.2 Remove contaminated clothing immediately and wash the affected skin with plenty of water.

11.3 If material has got into eyes, immediately wash with plenty of water for several minutes.

11.4 The patient should be given fresh air by moving him to a well-ventilated room and by dispersion of any crowd, if a person has inhaled vapour of methyl chloride or fumes produced by its burning, or it has come in contact with his skin or eyes. If respiration has stopped, start mouth to mouth artificial respiration at ones. Adrenalin should not be given in case of methyl chloride poisoning.

11.5 Due to delayed effect of poisoning, persons who have inhaled the gas or fumes produced in a fire must lie down and keep still. Patient should be kept under medical observation for at least 48 hours.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standard

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writting of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designation. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No CHD 07 (9236)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61, 37 86 26, 37 85 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43, 53 16 40, 53 23 84
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	41 24 42, 41 25 19, 41 23 15, 41 29 16,
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	632 92 95, 63 27 80, 632 78 92

Branches : AHMADABAD, BANGALORE, BHOPAL, BHUBANESHWAR, COIMBATORE FARIDABAD, GHAZIABAD, GUWAHATI, HYDERABAD, JAIPUR, KANPUR, LUCKNOW, PATNA, THIRUVANANTHAPURAM.

Printed at Printwell Printers, Aligarh, India